

Beamline 18-ID / Bio-CAT

Scientific focus: Static and dynamic studies of partially ordered biological systems

Scientific programs: X-ray fiber diffraction, x-ray scattering, x-ray absorption/emission spectroscopy, and x-ray imaging and tomography

Optics & Optical Performance

- 3.5–35 keV energy range
- vertical beam size: 2 mm unfocused–0.02 mm focused
- horizontal beam size: 5 mm unfocused–0.2 mm focused
- Rosenbaum-Rock high-resolution monochromator #1
6.5°–38° Bragg angle range
1st crystal, Si(111), liquid-nitrogen cooling
2nd crystal, Si(111), 10 mm wide (stabilized at 25°C, sagittally bent)
7:1 demagnification
35 mm beam offset (nominal)
motorized tune, twist, & roll control
(4 mm range, 50 nm resolution)
- Rosenbaum-Rock high-flux monochromator #2
6.5°–38° Bragg angle range
1st crystal, Si(400), liquid-nitrogen cooling
2nd crystal, Si(400), 10 mm wide (stabilized at 25°C, sagittally bent)
7:1 demagnification
35 mm beam offset (nominal)
motorized tune, twist, & roll control
(4 mm range, 50 nm resolution)
- Rosenbaum-Rock vertical focusing mirror
plane mirror substrate:
Zerodur
1020 mm x 95 mm x 38 mm
2 Å rms roughness
4 µrad surface figure error, mounted
Pt, none, and Pd coating stripes
two motorized, encoded supports
dynamic, independent bending mechanisms
at both ends
aberration correction via elliptical bending
11:1 demagnification

Experiment Station

18-ID-D

- monochromatic beam station
- 12 m x 5 m x 3 m

Detectors

- Fuji BAS 2500 image plate scanner
- 2000 x 3500 CCD detector with 26 µm pixels
- fast-time-slicing plastic scintillator array
- Lytle fluorescence detector
- multilayer fluorescence analyzer

Beamline Support Equipment/Facilities

- small-angle camera (up to 6 m camera length)
- Huber 4-circle (small), Huber 2-circle with quarter chi-segment
- Displex cryostat
- 3 ft x 5 ft optical table with five axes of motion

Insertion Device Source Characteristics (nominal)

source	Undulator A
period	3.30 cm
length	2.47 m
effective K_{\max} (at minimum gap = 10.5 mm)	2.78
energy range 1st harmonic	2.9 - 13.0 keV
energy range 1st - 5th harmonics	2.9 - 45.0 keV
on-axis peak brilliance at 6.5 keV	9.6×10^{18} ph/sec/mrad ² /mm ² /0.1% bw
source size at 8.0 keV \sum_x \sum_y	359 µm 21 µm
source divergence at 8.0 keV $\sum_{x'}$ $\sum_{y'}$	24 µrad 6.9 µrad